



THE LANGLEY DAAC

newsletter

PICASSO-
CENA

The

LITE

Project

Mission to Study Clouds & Aerosols



PICASSO-CENA (Pathfinder Instruments for Cloud and Aerosol Spaceborne Observations — Climatologie Etendue des Nuages et des Aerosols) has been selected by NASA as the next ESSP (Earth System Science Pathfinders) flight mission. This mission is co-led by NASA's Langley Research Center and the Institut Pierre Simon Laplace, Paris, France and consists of a unique partnership among Langley; France's Centre National D'Etudes Spatiales (CNES); the Institut Pierre Simon Laplace; Hampton University of Hampton, VA; Ball Aerospace and Technology Corporation, Boulder, CO; and NASA's Goddard Space Flight Center, Greenbelt, MD.

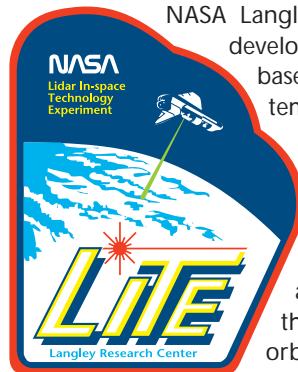
The instruments are designed to address the role of clouds and small atmospheric particles known as aerosols and their impact on the Earth's radiation budget. PICASSO-CENA will employ innovative light-detection and ranging (LIDAR) instrumentation to profile the vertical distribution of clouds and aerosols, while another instrument will simultaneously image the infrared (heat) emission of the atmosphere. During the daylight half of its orbit, PICASSO-CENA will measure the reflected sunlight in an oxygen-absorption band and take images of the atmosphere with a wide-field camera.

PICASSO-CENA will fly in a sun-synchronous 705 km circular orbit in formation with the EOS PM satellite and will be monitored and commanded from CNES facilities in France. The payload operations center will be located at NASA LaRC. Data will be downlinked 3 times daily and transferred to NASA LaRC where it will be processed and archived.

Along with the Earth Observing System satellites, PICASSO-CENA will establish the scientific basis for understanding the dynamics and energetics of Earth's atmosphere in support of short-term weather and long-term climate forecasts. The spacecraft is scheduled to be launched in 2003.

More information about this exciting mission can be found at the NASA LaRC Aerosol Research Branch web site (<http://www-arb.langley.nasa.gov/picasso-cena/picasso.html>)

LITE Data Now Available



NASA Langley Research Center has developed a number of ground based and airborne lidar systems over the last 25 years for the study of clouds, aerosols, water vapor, and ozone. Several studies were performed in the 1970s and early 1980s showing the benefits of operational orbital lidar systems to atmospheric studies. The

development of such operational systems first requires the validation of key enabling technologies. Toward this end, the Lidar In-space Technology Experiment (LITE) was initiated in 1985 to demonstrate operation of a lidar in space and the maturity of lidar technology.

LITE is a three-wavelength backscatter lidar which flew on Discovery as part of the STS-64 mission between September 9 and September 20, 1994. The LITE instrument was designed with the capability to make measurements of clouds, aerosols in the stratosphere and troposphere, the planetary boundary layer height, and atmospheric temperature and density in the stratosphere between 25 km and 40 km altitude. Additionally, limited measurements of the surface return strength over both land and ocean were collected to explore retrievals of surface properties. Most surface return data were collected at near-nadir angles, but several Landmark Track maneuvers were performed by Discovery to measure the angular dependence of the sea surface return.

To verify the accuracy of the LITE measurements, a worldwide correlative measurements program was organized by the LITE Science Steering Group. This effort employed airborne sensors and an extensive world-wide network of ground-based lidars. Over 60 ground-based lidars participated in the program, located in North and South America, Europe, Asia and Australia. Airborne instruments were particularly valuable in their ability to fly directly over the

(See **LITE** on Page 2)

...

*view_hdf***LITE***(continued from page 1)*

shuttle ground track and to make observations in remote regions. All aircraft carried at least one lidar, and several carried radiometers and *in situ* sensors. Aircraft were operated by NASA over the Atlantic ocean and eastern Caribbean sea, extending as far south as Cape Town, South Africa. The Canadian Atmospheric Environment Services operated a Con-
vair 580 near the coast of California, and two aircraft were operated in northern Europe under the aegis of the European Space Agency. A large amount of validation data was obtained which permitted thorough analysis of LITE performance.

Correlative measurement data reside with the individual researchers. LITE data were provided to the individual researchers, and they were responsible for comparisons. Several papers have been published with the comparisons and are available at the LITE web site (<http://www-arb.larc.nasa.gov/lite>). Also at this web site are browse images and photographs, and an extensive data user's guide.

The LITE mission in September 1994 was the first demonstration of space lidar for study of the Earth's atmosphere and resulted in the collection of 53 hours of data, equivalent to 35 orbits of the Earth. This is the first data set which provides the highly detailed vertical structure of clouds and aerosols on a global scale. The success of the mission demonstrates the maturity of lidar technology and the potential for long-term orbital lidars on free-flying platforms.

The LITE data are now available from the NASA Langley Data Center's web ordering tool.

...

view_hdf**a Visualization and Analysis Tool**

The NASA Langley Atmospheric Sciences Division in cooperation with the CERES Team and the Atmospheric Sciences Data Center has developed a visualization and analysis tool (*view_hdf*) to help access data from HDF products. This tool has been written in Interactive Data Language (IDL) and uses a

graphical user interface to manipulate the data. It also makes use of a shared library written in C which is accessed from the IDL program. The *view_hdf* tool can select and subset variables from either Science Data Sets (SDS) or *vdata* structures in an HDF file, render both two- and three-dimensional graphics, and plot geolocated data onto various world map projections. Other features include multiple variable plots, difference plots, and simple statistics. Plots can be saved in PostScript, encapsulated PostScript and GIF, or can be sent directly to a printer. Filtered subsets and statistical results can be written to a file in ASCII format for use in other analysis programs.

Although developed mainly for the CERES Project, this tool may be of more general use for other data sets written in HDF. The tool was developed on a Unix platform and has been transported to Sun, SGI, HP, and DEC Alpha workstations. It should be portable to platforms which support IDL, the HDF libraries, and a C compiler.

The *view_hdf* tool (Version 1) has been released by the CERES Team and is available on line at the Langley Atmospheric Sciences Data Center Web site. There is an accompanying User's Guide (in PS and PDF format) which provides detailed instructions for using the tool as well as examples from the CERES instrument. A readme file is also provided.

...

SAGE III Data Testing Begins

The Stratospheric Aerosol and Gas Experiment III (SAGE III) instrument is scheduled for launch on the Russian Meteor 3M platform in August, 1999. Results from SAGE III will improve aerosol characterization, improve and add to gaseous retrievals and extend the vertical range of measurements and sampling coverage of previous SAGE missions. The SAGE III Mission Operations Center (MOC) processes raw instrument data, producing products that are necessary for the SAGE III Science Computing Facility to compute high level data products which will be archived and distributed at the LaRC DAAC. Currently, the SAGE III MOC and the DAAC are working with the ECS to verify that data exchange between the systems is smooth and error free.

...

*Data**Testing*

New

•
FIRE_ACE_ER2_MAS

This is the first data to be released from the First ISCCP Regional Experiment–Arctic Cloud Experiment (FIRE.ACE) Campaign conducted over northern Alaska and the Arctic Ice Sheet. This data set utilized the MODIS Airborne Simulator (MAS), which is an airborne scanning spectrometer that acquired high spatial resolution imagery of cloud and surface features from its vantage point on-board a NASA ER-2 high-altitude research aircraft. Fifteen flights were conducted during the period 05/13/98–06/09/98.

Data

GTE_PEMT_DC8

The NASA DC-8 aircraft, which is based at the NASA Ames Research Center, operated from bases in Tahiti, Easter Island, New Zealand, and Fiji. Measurements on board the NASA DC-8 included chemical species such as ozone, SO₂, NO, CO, H₂O and Non-methane hydrocarbons, and additional quantities such as aerosols and photolysis rates of various chemical species. The data cover the period 08/30/1996–10/06/1996.

Available

GTE_PEMT_P3B

The NASA P3B aircraft, which is based at the NASA Wallops Island Flight Facility, operated from bases in Tahiti, Easter Island, Christmas Island, and Ecuador. Measurements on board the NASA P3B included chemical species such as Non-methane hydrocarbons, ozone, SO₂, H₂O₂, CO, CO₂, and additional quantities such as aerosols and photolysis rates of various chemical species. The data cover the period 08/18/1996–09/26/1996.

GTE_PEMT_OZONESONDES

Ozonesondes data were designed to collect, for study, a variety of information related to ozone, and were launched at sites in American Samoa, Fiji, New Zealand, and Tahiti during 08/18/1995–10/10/1996.

ISCCP D2

SRB_SW_LW_MONTHLY

The Langley Surface Radiation Budget (SRB) data set was produced with parameterized shortwave and longwave models which used satellite data (ISCCP-C1, ERBE S4) as input. The data set is a monthly average, global product covering the period July 1983 through June 1991. It contains SW and LW clear and all-sky surface radiative fluxes, cloud forcing, and meteorological parameters.

CD-ROM

NARSTO_NE_MODEL

The North American Research Strategy for Tropospheric Ozone 1998 Model-Intercomparison Study Verification Data compares meteorological, emis-

sions, and air quality models used to estimate how ambient ozone concentrations change in response to changes in VOC and NO_x emissions. These data are a subset of the measurements made during the NARSTO-Northeast 1995 intensive field campaign and are used to verify model predictions. Data were collected from May through September. One-hour average O₃, NO, and NO_x measurement results are reported from widely distributed ground surface monitoring stations operated by various agencies.

New Data Available

DATA SET NAME	NO. OF GRANULES	VOLUME (MB)
<i>FIRE_ACE_ER2_MAS</i>	266	110,751
<i>GTE_PEMT_DC8</i>	389	234
<i>GTE_PEMT_P3B</i>	262	602
<i>GTE_PEMT_OZONESONDES</i>	263	14
<i>SRB_SW_LW_MONTHLY</i>	96	91.8
<i>NARSTO_NE_MODEL</i>	4	45
<i>LITE</i>	1150	48,000

ISCCP D2 CD-ROM available

The ISCCP CD-ROM is now available from the NASA Langley Atmospheric Sciences Data Center. The CD-ROM contains the global monthly cloud products as produced for the International Satellite Cloud Climatology Project (ISCCP) at the Goddard Institute for Space Studies, New York, NY. ISCCP is sponsored by the World Climate Research Programme for the purpose of "collecting and analyzing satellite radiance measurements to infer the global distribution of cloud radiative properties and their diurnal and seasonal variations."

The data on the CD-ROM are the ISCCP Stage D2 data at 280 km spatial resolutions. The variables are available at monthly and three-hourly monthly resolution. The data available at the time of publication begin in January 1989 and extend through December 1993.

ACCESSING DATA:

The Langley DAAC provides multiple interfaces to access its data holdings. The graphical and character user interfaces allow users to search and order data. The web interfaces allow direct access to some data holdings for immediate downloading or placing media orders, for searching the data holdings and downloading electronically available holdings, and for ordering prepackaged CD-ROMs and videocassettes. All of these methods are easily accessible from the Langley DAAC web site at:

<http://eosweb.larc.nasa.gov>

...

The Langley DAAC Newsletter is a quarterly publication of the Langley Distributed Active Archive Center, NASA Langley Research Center, Hampton, VA 23681-2199. Contributions, comments, or questions are welcomed and may be submitted to the Langley DAAC User and Data Services office by phone at (757) 864-8656, by FAX at (757) 864-8807, or via e-mail at userserv@eosdis.larc.nasa.gov.

The Langley DAAC Newsletter is now available on-line at <http://eosweb.larc.nasa.gov/>
You will need a PDF reader such as Adobe Acrobat to open and view the Newsletter.

...

Upcoming Events:

"Climate and Global Change: Focus on the Americas"
79th American Meteorological Society's Annual Meeting
January 10-15
Wyndham Anatole Hotel, Dallas, Texas
Visit the DAAC's booth (#135) in Trinity Hall !

FIRE/SHEBA Science Team Meeting
January 24-29
Tucson, Arizona

CERES Science Team Meeting
April, 27-29 1999
Langley Research Center

•

•

PICASSO-CENA Mission

•

In

The LITE Project

•

This

SAGE III Data Testing

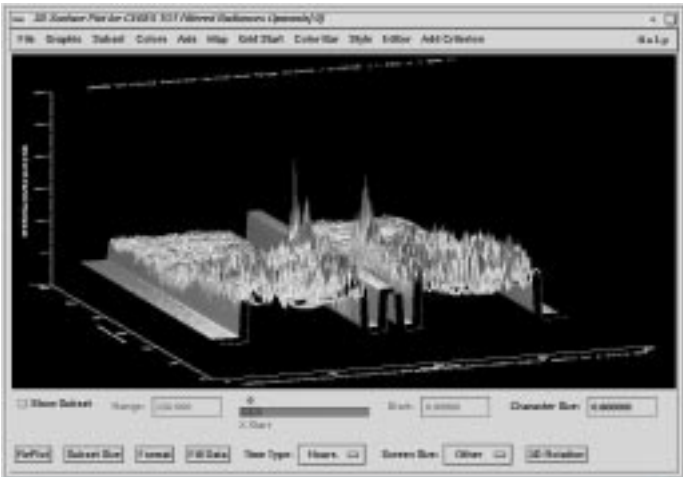
•

Issue

New Data

•

•



3-D Surface Plot using the view_hdf tool
(See article on page 2)

Official Business
Penalty for Private Use, \$300

National Aeronautics and
Space Administration
Langley Research Center
The Langley DAAC
User and Data Services Office
Mail Stop 167D
2 South Wright St.
Hampton, VA 23681-2199



Bulk Rate
Postage Fees Paid
NASA
Permit No. G-27